REMARKS

Claims 1, 2, 4-7, 9, 10, 12, 14, 15, 17 and 20-23 are presently pending in the application. Claim 23 has been added. Claims 3, 8, 11, 13, 16, 18 and 19 have been cancelled without prejudice. Claims 8 and 18 were indicated to be allowable in the parent application (U.S. Appl. Serial No. 09/650,289) where they were amended to overcome the Examiner's outstanding objections. The substance of claim 11 has been incorporated into independent claim 10, and the elements of claims 16 and 19 have now been incorporated into independent claim 15. No new matter has been added and support for the amendments to the claims can be found in the specification and drawings. In view of the above amendments and argument hereinbelow, Applicant respectfully submits that these claims are now in condition for allowance.

Claim Rejections -- 35 U.S.C. § 103(a)

Claims 1-7, 9-17 and 19-22 presently stand rejected under Section 103(a) in the parent application (U.S. Appl. Serial No. 09/650,289) as being unpatentable over Fishman et al. U.S. Pat. No. 5,930,414 ("Fishman"). Applicants respectfully submit that Fishman fails to teach or suggest the claimed invention.

In accordance with an aspect of the present invention, there is provided a method and apparatus for compensating for first-order and higher order polarization mode dispersion (PMD) of an optical signal. Applicants' invention is predicated on the observation that within a limited bandwidth, the rotation axis defined by the transmission matrix of the fiber tends to precess at a nearly constant rate. As set forth in claim 1, as amended, an exemplary device comprises:

> a first polarization state rotator that rotates the polarization angle of the optical signal in a frequency dependent-dependent manner;

> a first-order PMD compensator that receives the rotated signal and compensates for first-order PMD; and

> a second polarization state rotator that receives the first-order compensated signal *and inversely rotates the polarization angle of the first-order compensated signal in a frequency-dependent manner to compensate for higher-order PMD.* (Emphasis added.)

The Examiner contends that:

Fishman et al. discloses in FIG. 7 an optical device for compensating polarization mode dispersion (PMD) comprising a fast polarization scrambler 15 and a PMD compensator 25. The fast polarization scrambler is equivalent to the first order rotating device of the instant claim. Regarding claims 1-2, 10-13 and 15-17, the difference between Fishman et al. and the claimed invention is that the optical device of Fishman et al. only compensates for first order PMD. Fishman et al. teaches in col. 5, lines 18-22 and col. 11, lines 35-38 that by including additional similar sections with variable frequency dependent compensation, higher-order PMD can be compensated.... (See Office Action at ¶3.)

Applicants submit that Fishman fails to teach or suggest a device/method that compensates for higher-order PMD by performing a frequency-dependent rotation of the polarization angle of the optical signal, compensating for first-order PMD, and inversely performing a frequency-dependent rotation of the optical signal. Fishman is directed to a very specific implementation for compensating for first-order PMD. Fishman merely states at Col. 5, lines 18-22 that "an optical element (such as, for example, a combination of properly aligned birefringent fibers connected in series) that generates variable frequency dependent birefringence may be used in a similar manner to compensate for signal distortions due to higher-order PMD." Nothing in Fishman suggests implementing forward and inverse frequency-dependent rotations $R(\omega K)$ and $R^{-1}(\omega K)$ as claimed by Applicants.

The Examiner's assertion that "the whole effect of the compensation being described as $W \cdot D \cdot D^{-1} \cdot W^{-1}$, which can be written as $R \cdot R^{-1}$ where $R = W \cdot D$" and related citation to Col. 3, line 37 – Col. 4, line 53 of Fishman is misplaced. The derivation $U comp$ describes first-order PMD at an arbitrary orientation, not higher-order PMD. See Fishman at Col. 4, lines 52-53. The Examiner is equating the inverted matrices $D^{-1} \cdot W^{-1}$ to the inverse frequency dependent rotation $R^{-1}(\omega K)$ in the claimed invention. However, these are not the same thing. $D^{-1} \cdot W^{-1}$ in Fishman represent part of a polarization transfer function for an optical element that compensates *for first order PMD* by "introducing an opposite but equal amount of differential time delay $\tau_c = - \tau_f$ at the output of the fiber . . . ." See Fishman at Col. 4, lines 40-41. Fishman does not suggest performing an inverse transformation of the optical signal $R^{-1}(\omega K)$ as claimed in the present invention.

In view of the foregoing it is respectfully submitted that Fishman neither teaches nor suggests the claimed invention, and that claims 1, 2, 4-7, 9, 10, 12, 14, 15, 17 and 20-23 are in condition for allowance.

The Office is hereby authorized to charge any additional fees or credit any overpayments under 37 C.F.R. 1.16 or 1.17 to AT&T Corp. Account No. 01-2745. The Examiner is invited to contact the undersigned at (201) 224-7957 to discuss any matter concerning this application.

Respectfully submitted,
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